



AIR CONDITIONING SYSTEM

LIST OF MAKES OF SUB-VENDOR ITEMS-AS APPLICABLE

56	ROTAMETER	CHEMTROLS SAMIL / EUREKA IND / IL / TRANSDUCERS AND CONTROL
57	BATTERY CHARGER	AMARARAJA/ CHHABI ELECTRICAL / DUBAS ENGG. / HBL POWER SYSTEM / STATCON / CALDYNE
58	BATTERY (NI -Cd)	HBL POWER / AMCO SAFT / SAFT
NOTE		
		Above sub-vendor are also subjected to Customer approval during detailed engineering.



VENTILATION SYSTEM

LIST OF MAKES OF SUB-VENDOR ITEMS-AS APPLICABLE

LIST OF MAKES OF SUB-VENDOR ITEMS



VENTILATION SYSTEM

LIST OF MAKES OF SUB-VENDOR ITEMS-AS APPLICABLE

S.No.	Description	Makes
1.	AIR WASHER & UAF*	HYDERABAD POLLUTION CONTROL / SK SYSTEM / ADVANCE VENTILATION / DRAFT AIR / BLUE STAR / VOLTAS / STERLING WILSON & ROOTS COOLING SYSTEM / C.DOCTOR
2.	AIR HANDLING UNITS	
3.	CENTRIFUGAL FAN	FLAKT / KRUGGER / DRAFT AIR / HYDERABAD POLLUTION CONTROL / ADVANCE VENTILATION / PATEL AIR / NICOTRA/ SK SYSTEM / MARATHON / CB DOCTOR / SARLA
4.	AXIAL FLOW FANS/RE UNITS	HYDERABAD POLLUTION/ SK SYSTEM / ADVANCE VENTILATION / KRUGER / NICOTRA / MARATHON / FLAKT / CB DOCTOR/ PATEL AIR /SITAL
5.	FAN	FLAKT WOODS/ KRUGER/ ANDREW YULE/ AEROTHERM/ DUVENT/ SIWENT (SARLA)/ S.R PRAYAVARAN/ GEC(Alstom)
6.	CENTRIFUGAL WATER PUMP	BEST & CROMPTON / JYOTI / SAM TURBO / KBL / KSB / M&P / VOLTAS / BEACON-WEIR / WORTHINGTON / FLOWMORE / SULZER / BHARAT PUMPS & COMPRESSORS LTD / FLOWSERVE INDIA CONTROL PVT LTD / V-FLOW PUMPS & SYSTEMS CO
7.	INDUCTION MOTORS (LT)	SIEMENS / ABB / CGL / MARATHON / KEC / BHARAT BIJLEE / NGEF /JYOTI / LHP/ KIRLOSKAR/ G.E.C.
8.	AIR FILTER	PUROLATOR / FMI / ANFILCO / TENACITY / JOHN FOWLER /SPECTRUM / AIR TECH / PUROMATIC/ CHEMFARM/ KIRLOAKAR/ CLEAR AIR PUROFIL/ DYNA
9.	INSULATION MATERIAL	BEARDSHELL / K-FLEX / PARAMONT/ ARMAFLEX / SUPREME / LLOYDS / UP TWIGA
10.	RESIN BOUNDED FIBRE GLASS	UP TWIGA/ CLYOL/ COOLINE
11.	FIRE DAMPER	TSC / CARRYAIRE / RAVISTAR (SYSTEM AIR)
12.	BUTTERFLY VALVE	AUDCO / FOURESS / INTER VALVE / BDK / WEIR BDK / TYCO / CRANE PROCESS / KEYSTONE
13.	NON RETURN VALVE	LEADER / H.SARKAR / FLUID LINE / HI -TECH / CRESENT / A V VALVES / BANKIM & COMPANY / SHIVADURGA
14.	GATE/GLOBE VALVES	CRESENT / BDK / AUDCO / FOURESS / KIRLOSKAR / SANT / BOMBAY METAL & ALLOYS / BANKIM / LEADER / H SARKAR / AV VALVES / VENUS PUMPS AND ENGG
15.	PIPING - ERW	SURYA ROSHNI / TISCO / DADU PIPES / INDUS TUBE / WELSPUN / TATA / BST / JINDAL / SAIL
16.	GI SHEETS FOR DUCTING	TISCO / INDIAN IRON & STEEL CO LTD. / RASHITRYA ISPAT NIGAM LTD. / ESSAR/ ISPAT INDUSTRIES / JSW STEEL / LLOYDS STEEL / BHUSHAN / TATA / SAIL / JINDAL/ NIPPON
17.	HUMID STAT	JHONSON CONTROL / HONEYWELL / PENN
18.	GRILLES/ DIFFUSERS	MOOSA HAJI/ NUTECH/ COSMOS/ OPELLA/ CARYAIRE
19.	PRESSURE GAUGE	GENERAL INST CONSORTIUM / BELL / H.GURU INST / WAAREE INSTRUMENTS / H. GURU IND / FORBES MARSHALL / MANOMETER / A.N. INST / GAUGES BOURDON / GLUCK / WIKA / ASHCROFT / BAUMER TECHNOLOGIES/PRECISION MASS PRODUCTS/ BOSE PANDA/ FIEBIG/ JAPSIN/ MICA



VENTILATION SYSTEM

LIST OF MAKES OF SUB-VENDOR ITEMS-AS APPLICABLE

20.	THERMOSTATS	H.GURU/ FIEBIG/ JAPSIN/ MICA/ PENN/ HONEYWELL
21.	TEMPERATURE GAUGE	H. GURU IND/ H.GURU INST/ FORBES MARSHALL/DETRIVE INST & ELECTRONICS / PYRO ELECTRIC /TOSHNIWAL BROSS / WAREE INSTRUMENTS / A.N.INST / GOA INSTRUMENTS / WIKA/ ASHCROFT / H GURU (SI)/ BAUMER TECHNOLOGIES/ GAUGE BOURDON/ GOA THERMOSTAT/ BUDENBERG GAUGE/ PRECISION MASS PRODUCTS
22.	LEVEL GAUGE	GENERAL INSTRUMENTS / CHEMTROLS / SBEM, PUNE/ AUTOMAT MUMBAI /SIGMA / TOSHNIWAL / TECHNOMATIC / TELACO /LEVCON / D K INSTRUMENTS / PUNE TECHTROL / FLOW STAR/ BLISS ANAND
23.	PRESSURE SWITCH / DP SWITCHES	BELLS / DANFOSS / DK INSTRUMENTS/ DRESSER / SOR INC / VASU / SWITZER / INDFOSS / TRAFAG / GIC / ASHCROFT/ KASTURBA UDYOG/ BARKSDALE/ PRECISION MASS/ MITTAL REFRIGERATION
24.	LEVEL SWITCH	SBEM / BLISS ANAND / HI TECH / RAMAN INST / SIGMA / SOR INC / WAREE INST / LEVCON / DK INSTURMENT / V AUTOMAT /CHEMTROLS / SIMENS / FLOW STAR / TRAC/ NIVO CONTROLS/ PUNE TECHTROLS/ SAPCON INSTRUMENTS/ BAUMER TECHNOLOGIES/ GIC
25.	Y / POT STRAINER	MULTITEX / GREAVES COTTON / JAYPEE / SANT / OTOKLIN / GRAND PRIX / GUJARAT OTOLIFT / DS ENGG / SAROJINI ENTERPRISE / BHATIA ENGINEERING / FILTERATION ENGINEERS INDIA PVT LTD / SUNGOV ENGINEERING
26.	CONTROL PANEL	INDUSTRIAL CONTROL & APPLIANCE/ PYROTECH /POSITRONICS / CONTROL & SWITCHGEAR /SIEMENS / L&T /GE POWER /RITTAL / HOFFMAN
27.	SWITCHGEAR	(MCCB, CROMPTON/ SIEMENS/ ABB/ L&T CONTRACTORS ETC.)
28.	CABLES	FINOLEX/ NICCO/ UNIVERSAL CABLES/ GRANDLEY/ CCI/ POLYCAB/ FORT GLOSTER
NOTE		
		* Designed by C. Doctor / Blue Star / Voltas / Hyderabad Pollution Controls / SK System /Advance Ventilation / Draft Air / Sterling & Wilson / Roots cooling and fabricated by their approved fabricators.
		Above sub-vendor are also subjected to Customer approval during detailed engineering.



**4x111MW VISHNUGAD PIPALKOTI HEP
HVAC
MANDATORY SPARE LIST**

SPECIFICATION No: PE-TS-413-571-11000A-A001

SECTION : I

SUB-SECTION : E

REV 00

DATE: JAN 2020

SHEET

**SECTION-I
SUB SECTION -E**

**ANNEXURE-II
MANDATORY SPARE LIST**

ANNEXURE - II
LIST OF MANDATORY SPARES

S. No.	Description	UNIT	Qty
A	VENTILATION SYSTEM		
1	Bearings for each type of fan	Set	2
2	Bearings set for each type of electric motor	Set	2
3	V-Belts / Flexible coupling for each type of fan	Set	2
4	Filter element	Sets	2
5	Water Cooler	Set	1
B	AIR CONDITIONING SYSTEM		
B1	Ductable Split AC		
1	Fan-motor bearing for outdoor unit & indoor unit	Set	2
2	Filter	Set	2
3	Expansion valve	Set	2
B2	Non- Ductable Split AC		
1	Fan-motor bearing for outdoor unit	Set	2
2	Filter	Set	2
3	Expansion valve	Set	2
C	ELECTRICAL SPARES		
1	Spare cable lengths of each type and size of power cables used	5% of the total cable length but at least one length equal to the longest cable length used in the scope.	
2	Cable racks, trays, supports, embedment plats, conduits etc.	5% of the total scope of quantities of each type & size	
3	Other Accessories:		
	Termination kits for each type and size of cable Sealing ends / glands for each cable size Cable lugs for each type and size of cable Pre-fabricated straight through joints for each type and size of cables Cable marker ferrules Self adhesive marker Aluminium strips Couplings, elbow plates, G.I. flats, brackets, rock bolts etc. (for each type)	5% of the total scope of each accessory but not less than 2pcs. of each item	
4	415V completely assembled ACBs	10% of each type but not less than one	
5	415 V MCCBs	10% of each type but not less than one	
6	240 V AC, MCBs	10% of each type but not less than one	
7	220V DC MCBs	10% of each type but not less than one	
8	Spares for ACBs -1No. Each of following		
i)	i) Main Contacts	5 sets of each rating	
ii)	ii) Arcing contacts	5 sets of each rating	
iii)	iii) Trip coils	10 nos. of each rating	
iv)	iv) Closing coils	10 nos. of each rating	
v)	v) Spring charging	6 nos. for each rating mechanism complete with motors	
vi)	vi) Closing & tripping springs	4 sets of each ratings	
vii)	vii) Auxiliary contact assembly	6 nos. of each rating	
viii)	viii) Local/Remote selector	4 Nos. of each rating switch	
6	Relays	2 nos. of each type	
7	7. CTs	2 set of each rating	
8	8. PTs	2 set of each rating	
9	9. Voltmeters	2 nos.	
10	10. Ammeters	6 nos.	
11	11. KWH meters	6 nos.	

12	12. Glass covers for relays with rubber gaskets	6 nos. of each size
13	13. Glass covers for measuring instruments with rubber gaskets	6 nos. of each size
14	14. Indicating lamps	200 nos.
15	15. Indicating lamp assembly	200 nos. (W/O lamp)
16	16. Glass dome covers of different colours	500 nos. of each colour
17	Fuse units	100 sets of each rating
18	Push buttons	100 nos. of each shade
19	Contactors	12 nos. of each rating
20	Timers	12 nos.
21	Terminal blocks	50 nos.
22	Brass screws	50 packets of each size
23	Spring washers	50 packets of each size
24	Ferrules	1000 nos. of each size
25	Auto-manual switches	12 nos.
26	Bus bar supporting insulators with fittings	30 nos.
27	Strip heaters	12 nos.
28	Thermostats for heaters	6 nos.
D	C&I SPARES	
1	Measuring transmitter of type / model used	02 sets of each type
2	Sensors/transducers of type and model used	02 sets of each type
3	Indicating instruments of type/model used	02 sets of each type
4	Relays of type/model used	02 sets of each type
5	Indicating Instruments	01 set of each type
6	Control Switch, Selector Switches, Push Buttons, Indicating	20 % of each type
7	Bulbs for indicating lamps	20 % of each type
8	Heating resistor for thermostat for cubicle heater	02 sets of each type
9	Operator Key board	One
10	Terminals of each type	200
11	Fuses of each type	200 each type

Notes:

a) Spares listed in Price Schedule is bare minimum requirement. In case any additional mandatory spares required for 5 years of successful operation of the system or those covered elsewhere in the tender specification apart from specified above, same shall be deemed to have been covered in bidder's scope of supply.

b) One set corresponds to actual quantity of components and devices as installed for one equipment/item/assembly.

c) All Spares shall be supplied as per the requirement of the specifications. In case any spare indicated in the specification is "not applicable" for particular equipment, then suitable applicable alternate spare has been offered / shall be supplied by the bidder without

d) Any item which is quoted as "not applicable" by the bidder in the above list and is found to be "applicable" at a later date shall be supplied by the bidder without any commercial and delivery implication.

e) Any cell left blank in the unpriced schedule shall be treated as "Quoted" and is included in total price.



**4x111MW VISHNUGAD PIPALKOTI HEP
HVAC SYSTEM
LIST OF TOOLS & TACKLES**

SPECIFICATION No: PE-TS-413-571-11000A-A001

SECTION: I

SUB-SECTION : E

REV 00

DATE: JAN 2020

SHEET 1 OF 2

**SECTION-I
SUB-SECTION-E
ANNEXURE-III
LIST OF TOOLS & TACKLES**



**4x111MW VISHNUGAD PIPALKOTI HEP
HVAC SYSTEM
LIST OF TOOLS & TACKLES**

SPECIFICATION No: PE-TS-413-571-11000A-A001

SECTION: I

SUB-SECTION : E

REV 00

DATE: JAN 2020

SHEET 2 OF 2

SL NO	ITEM DESCRIPTION	UNIT	QTY
1	FLAT D WRENCH - 6 MM TO 32 MM (12 Pcs)	SET	1
2	BOX WRENCHES - 6 MM TO 22 MM (14 Pcs)	SET	1
3	RING SPANNER - 6 MM TO 32 MM (12 Pcs)	SET	1
4	ALLEN KEYS - 2 MM TO 10 MM	SET	1
5	CRESCENT SCREW SPANNER	NO.	1
6	SCREW DRIVER	NO.	1
7	OFFSET SCREW DRIVER	NO.	1
8	INSULATED PLIER	NO.	1
9	TORCH LIGHT FOR 2 CELL	NO.	1
10	HAMMER 1 LB	NO.	1
11	OIL CAN	NO.	1
12	POCKET THERMOMETER - 0 TO 50 DEG. C)	NO.	1
13	INSULATION TAPE ROLL	NO.	1
14	STEEL FOOT RULE - 12"	NO.	1
15	FEELER GAUGE 9 BLADES	NO.	1
16	PIPE WRENCH	NO.	1
17	FLARE NUT (1/4")	NOS.	6
18	FLARING TOOL	NO.	1
19	TUBE CUTTER	NO.	1
20	GAS CHARGING PIPE	NO.	1
21	NITROGEN CHARGING ADAPTER	NO.	1
22	FREON PRESSURE GAUGE (2 1/2" DIA DIAL)) 0 - 300 MM PSI	NO.	1
23	FREON PRESSURE GAUGE (2 1/2" DIA DIAL)) 30 - 150 MM PSI	NO.	1
24	PSYCHRO METER	NO.	1
25	LOCK WITH KEY FOR TOOL BOX	NO.	1
26	RATCHET 1/4"	NO.	1
27	MS TOOL BOX	NO.	1



**4x111MW VISHNUGAD PIPALKOTI HEP
HVAC SYSTEM
DRAWINGS / DOCUMENTS
SUBMISSION PROCEDURE**

SPECIFICATION No: PE-TS-413-571-11000A-A001

SECTION : I

SUB-SECTION : E

REV 00

DATE: JAN 2020

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SECTION-I

SUB-SECTION-E

ANNEXURE-IV

**DRAWINGS / DOCUMENTS SUBMISSION PROCEDURE
(COVERED UNDER SECTION C2-B)**



**4x111MW VISHNUGAD PIPALKOTI HEP
HVAC SYSTEM
MASTER DRAWING LIST WITH
SCHEDULE OF SUBMISSION**

SPECIFICATION No: PE-TS-413-571-11000A-A001

SECTION : I

SUB-SECTION : E

REV 00

DATE: JAN 2020

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SECTION-I

SUB-SECTION-E

ANNEXURE-V

**MASTER DRAWING LIST WITH SCHEDULE OF
SUBMISSION**



**4x111MW VISHNUGAD PIPALKOTI HEP
HVAC SYSTEM
MASTER DRAWING LIST WITH
SCHEDULE OF SUBMISSION**

SPECIFICATION No: PE-TS-413-571-11000A-A001
SECTION : I
SUB-SECTION : E
REV 00 **DATE: JAN 2020**
SHEET 2 OF 3

S. NO.	DRAWING NO	DRG./ DOC. TITLE	SCH. WEEK (FROM DATE OF LOI)
1	PE-V0-413-571-11000-A -A001	INSPECTION CATEGORISATION PLAN HVAC	04
2	PE-V0-413-571-11000-A -A002	QUALITY PLAN OF CENTRIFUGAL PUMPS	17
3	PE-V0-413-571-11000-A -A004	QUALITY PLAN OF AHU	16
4	PE-V0-413-571-11000-A -A005	QUALITY PLAN OF CENTRIFUGAL FANS	14
5	PE-V0-413-571-11000-A -A006	QUALITY PLAN OF AXIAL FANS	16
6	PE-V0-413-571-11000-A -A007	QUALITY PLAN OF MOTOR	18
7	PE-V0-413-571-11000-A -A008	QUALITY PLAN OF MCC/ SWITCHGEAR	18
8	PE-V0-413-571-11000-A -A009	QUALITY PLAN OF CABLES	18
9	PE-V0-413-571-11000-A -A101	HEAT LOAD CALCULATION FOR HVAC AREAS	04
10	PE-V0-413-571-11000-A -A102	OPERATION AND CONTROL PHILOSOPHY FOR HVAC SYSTEM	04
11	PE-V0-413-571-11000-A -A103	PRESSURE DROP CALCULATION FOR CIRCULATING WATER PIPING	14
12	PE-V0-413-571-11000-A -A104	VENTILATION FAN SCHEDULE.	24
13	PE-V0-413-571-11000-A -A105	SPLIT AC SCHEDULE	19
14	PE-V0-413-571-11000-A -A201	DATA SHEET & GA FOR PUMPS WITH FOUNDATION DETAILS.	19
15	PE-V0-413-571-11000-A -A202	DATA SHEET & GA FOR AHU WITH FOUNDATION DETAILS.	19
16	PE-V0-413-571-11000-A -A203	DATA SHEET & GA FOR SPLIT AC	16
17	PE-V0-413-571-11000-A -A204	DATA SHEET & GA FOR CENTRIFUGAL FANS	16
18	PE-V0-413-571-11000-A -A205	DATA SHEET & GA FOR AXIAL AND PROPELLAR FANS	16
19	PE-V0-413-571-11000-A -A206	DATA SHEET & GA FOR VALVES AND STRAINER.	13
20	PE-V0-413-571-11000-A -A207	DATA SHEET FOR INSULATION.	16
22	PE-V0-413-571-11000-A -A208	DATA SHEET & GA FIRE DAMPER.	14
23	PE-V0-413-571-11000-A -A209	DATA SHEET FOR INSTRUMENTS (PRESSURE GAUGE, TEMP GAUGE, LEVEL GAUGE, PRESSURE SWITCH, LEVEL SWITCH).	16
24	PE-V0-413-571-11000-A -A210	DATA SHEET OF PIPE.	9
25	PE-V0-413-571-11000-A -A211	DATA SHEET OF GI AND MS SHEET.	9
26	PE-V0-413-571-11000-A -A212	DATA SHEET & GA FOR PRE AND FINE FILTERS.	14
27	PE-V0-413-571-11000-A -A213	DATA SHEET & GA FOR MOTORS (Fan, pumps, RE units, Supply and Exhaust axial fans)	19
28	PE-V0-413-571-11000-A -A214	DATA SHEET & GA FOR HEATERS	10



**4x111MW VISHNUGAD PIPALKOTI HEP
HVAC SYSTEM
MASTER DRAWING LIST WITH
SCHEDULE OF SUBMISSION**

SPECIFICATION No: PE-TS-413-571-11000A-A001

SECTION : I

SUB-SECTION : E

REV 00

DATE: JAN 2020

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S. NO.	DRAWING NO	DRG./ DOC. TITLE	SCH. WEEK (FROM DATE OF LOI)
29	PE-V0-413-571-11000-A -A215	DATA SHEET & GA FOR CYCLONE SEPERATOR & DUPLEX FILTERS	10
30	PE-V0-413-571-11000-A -A501	PID FOR HVAC SYSTEM	04
31	PE-V0-413-571-11000-A -A502	TYPICAL Details DUCT FABRICATION DRAWING / SUPPORT / ERECTION. INSULATION OF DUCTING / PIPING & EQUIPMENTS PIPE ERECTION	10
32	PE-V0-413-571-11000-A -A503	AC DUCT LAYOUT FOR CONTROL ROOM	21
33	PE-V0-413-571-11000-A -A504	VENTILATION ROOM & VENTILATION DUCT LAYOUT FOR ALL THE FLOOR FOR POWER HOUSE	21
34	PE-V0-413-571-11000-A -A505	VENTILATION ROOM & VENTILATION DUCT LAYOUT FOR ALL THE FLOOR FOR TRANSFORMER CAVERN	17
35	PE-V0-413-571-11000-A -A506	VENT. ARRANGEMENT FOR BATTERY ROOM.	16
36	PE-V0-413-571-11000-A -A507	FRESH & EXHAUST AIR DUCT LAYOUT	25
37	PE-V0-413-571-11000-A -A508	VENT. ARRANGEMENT FOR VARIOUS AUXILIARY BUILDING.	25
38	PE-V0-413-571-11000-A -A701	ELECTRICAL PANEL DRAWING INCULDING SLD	25
39	PE-V0-413-571-11000-A -A702	TDS OF PLC WITH CONFIGURATION DIAGRAM, BILL OF MATERIAL, GA & INTERNAL WIRING DIAGRAM, LOGIC FLOW DIAGRAM, IO WIRING DIAGRAM , PLC ROOM LAYOUT	22
40	PE-V0-413-571-11000-A -A703	ELECTRICAL FEEDER LIST.	22
41	PE-V0-413-571-11000-A -A704	CABLE SCHEDULE	22
42	PE-V0-413-571-11000-A -A705	TDS FOR POWER AND CONTROL CABLES-TYPE TEST CERTIFICATE FOR CALES, TYPE TEST PROCEDURE, CROSS SECTION	22
43	PE-V0-413-571-11000-A -A706	TDS AND GA FOR ELECTRICAL PANEL- SCHEME, SLD, BILL OF MATERIAL	22
44	PE-V0-413-571-11000-A -A707	TDS FOR CABLING-CABLE TRAY, CABLE SUPPORT, TYPE TEST CERTIFICATE, JOINTING KITS, TRIFOIL CLAMPS, ABOVE GROUND EARTHING	25
45	PE-V0-413-571-11000-A -A901	PERFORMANCE/ DEMONSTRATION TEST	20



**4x111MW VISHNUGAD PIPALKOTI HEP
HVAC SYSTEM
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SPECIFICATION No: PE-TS-413-571-11000A-A001

SECTION : I

SUB-SECTION : E

REV 00

DATE: JAN 2020

SHEET 4 OF 3

S. NO.	DRAWING NO	DRG./ DOC. TITLE	SCH. WEEK (FROM DATE OF LOI)
		PROCEDURE.	

Note:

The above is not the complete list and may change during detail engineering



**4x111MW VISHNUGAD PIPALKOTI HEP
HVAC SYSTEM
FORMAT FOR OPERATION AND
MAINTENANCE MANUAL**

SPECIFICATION No: PE-TS-413-571-11000A-A001

SECTION : I

SUB-SECTION : E

REV 00

DATE: JAN 2020

SHEET 1 OF 4

**SECTION-I
SUB-SECTION-E
ANNEXURE-VI
FORMAT FOR OPERATION AND MAINTENANCE
MANUAL**



**4x111MW VISHNUGAD PIPALKOTI HEP
HVAC SYSTEM
FORMAT FOR OPERATION AND
MAINTENANCE MANUAL**

SPECIFICATION No: PE-TS-413-571-11000A-A001
SECTION : I
SUB-SECTION : E
REV 00 **DATE: JAN 2020**
SHEET 2 OF 4

Project name :
Project number :
Package Name :
PO reference :
Document number :
Revision number :

Sl.no. & Sections	Description	Tick (√)if included in Manual			Remarks
		Yes	No	Not Applicable	
1.	COVER PAGE				
1.1	Project Name				
1.2	Customer/consultant Name				
1.3	Name of Package				
1.4	Supplier details with phone, FAX ,email address , Emergency Contact number				
1.5	Name and sign of prepared by , checked by & approved by				
1.6	Revision history with approval Details				
2.0	INDEX				
2.1	showing the sections & related page nos All the pages should be numbered section wise				
3.0	DESCRIPTION OF PLANT/SYSTEM				
3.1	Description /write up of operating principle of system equipment/ associated sub-systems & accessories/controls system , operating conditions, performance parameters under normal , start up and special cases				
3.2	Equipment list and basic parameter with Tag numbers				
3.3	Data sheets approved by Customer/for information and catalogues provided by original manufacturer				
3.4	Associated other packages and Interface /terminal points				
3.5	P&ID & Process Diagrams				
3.6	GA Layout drawings, As-built drawings , Actual photograph of items/system (Drawings of A2 & bigger sizes are to be attached in the last)				
3.7	Single line/wiring diagrams				



**4x111MW VISHNUGAD PIPALKOTI HEP
HVAC SYSTEM
FORMAT FOR OPERATION AND
MAINTENANCE MANUAL**

SPECIFICATION No: PE-TS-413-571-11000A-A001

SECTION : I

SUB-SECTION : E

REV 00

DATE: JAN 2020

SHEET 3 OF 4

Sl.no. & Sections	Description	Tick (V)if included in Manual			Remarks
		Yes	No	Not Applicable	
3.8	Control philosophy /control write-ups				
4.0	COMMISSIONING ACTIVITIES (IF NOT COVERED IN SEPARATE DOCUMENT I.E. ERECTION MANUAL, COMMISSIONING MANUAL)				
4.1	Pre-Commissioning Checks				
4.2	handling of items at site				
4.3	Storage at site				
4.4	Unpacking & Installation procedure				
5.0	OPERATION GUIDELINES FOR PLANT PERSONAL/USER/OPERATOR				
5.1	Interlock & Protection logic along with the limiting values of protection settings for the equipment along with brief philosophy behind the logic, drawings etc. to be provided.				
5.2	Start up, normal operation and shut down procedure for equipments along with the associated systems in step by step mode. Valve sequence chart, step list, interlocks etc. with Equipment isolating procedures to be mentioned.				
5.3	Do's & Don't of the equipments.				
5.4	Safety precautions to be taken during normal operation. Safety symbols, Emergency instructions on total power failure condition/lubrication failure/any other condition				
5.5	Parameters to be monitored with normal values and limiting values				
5.6	Trouble shooting with causes and remedial measures				
5.7	Routine operational checks, recommended logs & records				
5.8	Changeover schedule if more than one auxiliary for the same purpose is given				
5.9	Painting requirement and schedule				
5.10	Inspection, repair , Testing and calibration procedures				
6.0	MAINTENANCE GUIDELINES FOR PLANT				



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REV 00

DATE: JAN 2020

SHEET 4 OF 4

Sl.no. & Sections	Description	Tick (V)if included in Manual			Remarks
		Yes	No	Not Applicable	
	PERSONAL				
6.1	List of Special Tools and Tackles required for Overhaul/Trouble shooting including special testing equipment required for calibration etc.				
6.2	Stepwise dismantling and re-assembly procedure clearly specifying the tools to be used, checks to be made, records to be maintained, clearances etc. to be mentioned. Tolerances for fitment of various components to be given.				
6.3	Preventive Maintenance & Overhauling schedules linked with running hours/calendar period along with checks to be given				
6.4	Long term maintenance schedules especially for structural, foundations etc.				
6.5	Consumable list along with the estimated quantity required during commissioning, normal running and during maintenance like Preventive Maintenances and Overhaul. Storage/handling requirement of consumables/self-life.				
6.6	List of lubricants with their Indian equivalent, Lubrication Schedule, Quantity required for each equipment for complete replacement is to be given				
6.7	List of vendors & Sub-vendors with their latest addresses, service centres ,Telephone Nos., Fax Nos., Mobile Nos., e-mail IDs etc.				
6.8	List of mandatory and recommended spare parts list				
6.9	Tentative Lead time required for ordering of spares from the equipment supplier				
6.10	Guarantee and warranty clauses				
7.0	Statutory and other specific requirements considerations.				
8.0	List of reference documents				
9.0	Binding as per requirement				



**4x111MW VISHNUGAD PIPALKOTI HEP
HVAC SYSTEM
SITE STORAGE AND PRESERVATION**

SPECIFICATION No: PE-TS-413-571-11000A-A001

SECTION : I

SUB-SECTION : E

REV 00

DATE: JAN 2020

SHEET 1 OF 16

**SECTION-I
SUB-SECTION-E
ANNEXURE-VII
SITE STORAGE AND PRESERVATION**

SITE STORAGE AND PRESERVATION GUIDELINES

FOR

MECHANICAL BOPs

(Doc No: PE-DC-SSG-A001 REV.00)



PROJECT ENGINEERING MANAGEMENT, POWER SECTOR
BHARAT HEAVY ELECTRICALS LIMITED-NOIDA

CONTENT

- 1 SCOPE OF THE DOCUMENT
- 2 PURPOSE OF STORAGE & PRESERVATION
- 3 MEASURES TO BE TAKEN FOR STORAGE AND PRESERVATION
 - a) GENERAL STORAGE REQUIREMENTS
 - b) GENERAL PRESERVATION REQUIREMENTS
 - c) GENERAL INSPECTION REQUIREMENTS
- 4 TYPE OF STORAGE FOR VARIOUS EQUIPMENT
5. CONCLUSION
6. STACKING ARRANGEMENT FOR PLATES AND STRUCTURAL STEEL

1. SCOPE OF THE DOCUMENT

This guideline is prepared in intent to provide proper site storage and preservation of the Mechanical, Electrical and C & I items / equipment supplied under various bought out packages/items. This storage procedure shall be followed at different power plant sites by concerned agency for storage and preservation from the date of equipment received at site until the same are erected and handed over to the customer.

2. PURPOSE OF STORAGE & PRESERVATION

Many of the items may be required to be kept in stores for long period. It shall therefore be essential that proper methods of storage and preservation be applied so that items do not deteriorate, loose some of their properties and become unusable due to atmospheric conditions and biological elements.

3. MEASURES TO BE TAKEN FOR STORAGE, HANDLING & PRESERVATION

a) GENERAL STORAGE REQUIREMENTS

1. To the extent feasible, materials should be stored near the point of erection. The storage areas should have adequate unloading and handling facilities with adequate passage space for movement of material handling equipment such as cranes, fork lift trucks, etc. The storage of materials shall be properly planned to minimise time loss during retrieval of items required for erection.
2. The outdoor storage areas as well as semi-closed stores shall be provided with adequate drainage facilities to prevent water logging. Adequacy of these facilities shall be checked prior to monsoon.
3. The storage sheds shall be built in conformity with fire safety requirements. The stores shall be provided with adequate lights and fire extinguishers. 'No smoking' signs shall be placed at strategic locations. Safety precautions shall be strictly enforced.
4. Adequate lighting facility shall be provided in storage areas and storage sheds and security personnel positioned to ensure enforcement of security measures to prevent theft and loss of materials.
5. Adequate number of competent stores personnel and security staff shall be deployed to efficiently store and maintain the equipment / material.
7. The equipment shall be stored in an orderly manner, preserving their identification slips, tags and instruction booklets, etc., required during erection. The storage of materials shall be equipment-wise. Loose parts shall be stored in sheds on racks,

preserving the identification marks and tags in good condition. The group codes shall be displayed on the racks

6. At no time shall any materials be stored directly on ground. All materials shall be stored minimum 200 mm above the ground preferably on wooden sleepers

b) GENERAL PRESERVATION REQUIREMENTS

1. All special measures to prevent corrosion shall be taken like keeping material in dry condition, avoiding the equipment coming in contact with corrosive fluid like water, acid etc.
2. Materials which carry protective coating shall not be wrapped in paper, cloth, etc., as these are liable to absorb and retain moisture. The material shall be inspected and in case of signs of wear or damages to protective coating, that portion shall be cleaned with approved solution and coated with an approved protective paint. Complete record of all such observations and protective measures taken shall be maintained.
3. Generally equipment supplied at site are properly greased or rust protective oil is applied on machined/ fabricated components. However periodic inspection shall be carried out to ensure that protection offered is intact.
4. While handling the equipment, no dragging on the ground is permitted. Avoid using wire rope for lifting coated components. Use polyester slings (if possible) otherwise protective material (e.g. clothes, wood block etc.) should be used while handling the components with rope / slings
5. For Equipment supplied with finished paint, touch paint shall be done in case any surface paint gets peeled off during handling. Otherwise such surfaces shall necessarily be wrapped with polythene to avoid any corrosion. Further for equipment wherein finish coat is to be applied at site, site to ensure that equipment is received with primer coat applied.
6. It shall be ensured by periodic inspection that plastic inserts are intact in tapped holes, wherever applicable.
7. Pipes shall be blown with air periodically and it shall be ensured that there is no obstruction.
8. Silica gel or approved equivalent moisture absorbing material in small cotton bags shall be placed and tied at various points on the equipment, wherever necessary.
9. Heavy rotating parts in assembled conditions shall be periodically rotated to prevent corrosion/jamming due to prolonged storage.

10. All the electrical equipment such as motors, generators, etc. shall be tested for insulation resistance at least once in three months and a record of such measured insulation values shall be maintained.
11. Following preservatives/preservation methods can be used depending upon type of equipment
 - a. Rust preventive fluid (RPF)
 - b. Rust protective paints
 - c. Tarpaulin covers, in case of outdoor storage
 - d. De-oxy aluminate for weld-ments

c) GENERAL INSPECTION REQUIREMENTS

1. Period inspection of materials with specific reference to –
 - Ingress of moisture and corrosion damages.
 - Damage to protective coating.
 - Open ends in pipes, vessels and equipment -
 - In case any open ends are noticed, same shall be capped.
2. Any damages to equipment / materials.
 - In case of any damages, these shall be promptly notified and in all cases, the repairs / rectification shall be carried out.
 - Any items found damaged or not suitable as per project requirements shall be removed from site. If required to store temporarily, they shall be clearly marked and stored separately to prevent any inadvertent use.

4. TYPE OF STORAGE FOR VARIOUS EQUIPMENT

The types of storage are broadly classified under the following heads:

i **Closed storage with dry and dust free atmosphere. (C)**

The closed shed can be constructed by using cold-rolled / tubular components for structure and corrugated asbestos sheets / galvanised iron sheets for roofing. Brick walls / asbestos sheets can be used to cover all the sides. The floor of the shed can be finished with plain cement concrete suitably glazed. The shed shall be provided with proper ventilation and illumination.



ii **Semi-closed storage. (S)**

The semi closed shed can be constructed by using cold-rolled / tubular components for structure and corrugated / asbestos sheets for roofing. The floor shall be brick paved. If required a small portion of sides can be covered to protect components from rainwater splashing onto the components.





iii Open storage (O)

The open yard shall be levelled, well consolidated to achieve raised ground with the provision of feeder roads for crane approach along with access roads running all sides. One part of the open yard shall be stone pitched, levelled and consolidated with raised ground suitable for storing / stacking heavier and critical components with due space to handle them by cranes etc . Adequate number of sleepers, concrete block etc. to be provided to make raised platforms to stack critical materials.

A separate yard to be identified as “scrap yard” slightly away from main open yard to store wooden/steel scraps, which are to be disposed off. This is required to avoid mix up with regular components as well as to avoid fire hazard.

Some of the components, which are having both machined & un-machined surfaces and are bulky, shall be stored in open storage area on a raised ground and suitably covered with water proof / fire retardant tarpaulin.



The equipment listed below shall be stored and inspected as per requirement mentioned in the table below.

Sl. No.	Description of the equipment	Type of Storage	Check for	Remarks
Raw material /mechanical items like pipes, plates, structure sections etc.)				
1.	Steel pipes (lined/unlined)	S	Damage , paint, corrosion, rubber lining peeling	Provide end cap
2.	MS Plates	S	Damage, paint, corrosion	
3.	SS Plates	S	Damage	
4.	Non-metallic pipes	S	Damage, cracks	Provide end cap
5.	Stainless steel pipes	S	Damage ,	Provide end cap
6.	MS sections, beams	S	Damage, paint, corrosion	
7.	Cable trays	S	Damage, condition of preservations	
8.	Insulation sheets	S	Damage	
9.	Insulation	C	Damage, packing	
10.	Hangers Rods	S	Damage, paint, packing	
11.	Tubes	S	Damage, paint , packing	Provide end cap
12.	Hume pipes	O	Damage	
13.	Castings	O	Damage, paint, corrosion	
Fabricated mechanical items (pressure vessels, tanks etc.)				
14.	Pressure vessels (unlined)	O	Damage, paint, corrosion,	Covered nozzles
15.	Atmospheric storage tanks (unlined)	O	Damage, paint, corrosion	Covered nozzles

Sl. No.	Description of the equipment	Type of Storage	Check for	Remarks
16.	Pressure vessels (lined)	S	Damage, paint, corrosion, rubber lining	
17.	Atmospheric storage tanks(lined)	S	Damage, paint, corrosion, rubber lining	
18.	Support structures	O	Damage , paint, corrosion	
19.	Flanges	C	Damage , paint, corrosion	
20.	Fabricated pipes	S	Damage , paint, corrosion	Provide end cap
21.	Vessels internals	C	Damage , paint, corrosion ,packing	
22.	Grills	S	Damage , paint, corrosion	
23.	Angles	S	Damage , paint, corrosion	
24.	Bridge mechanism/clarifier mechanism	O	Damage , paint, corrosion	
25.	Cranes, rails	S	Damage , paint, corrosion	
26.	Stair cases	O	Damage , paint, corrosion	
27.	Ladders/handrails	O	Damage , paint, corrosion	
28.	Fabricated ducts	S	Damage , paint, corrosion	
29.	Isolation Gates	O	Damage , paint, corrosion	
30.	Fabricated boxes/panels	S	Damage , paint, corrosion	
Mechanical components like valves, fittings, cables glands, spares etc.)				
31.	Valves	S	Damage , packing	

Sl. No.	Description of the equipment	Type of Storage	Check for	Remarks
32.	Fittings	S	Damage , packing	Provide end cap
33.	Cable glands	C	Damage , packing	
34.	Tools & tackles	C	Damage , packing	
35.	Nut , bolts, washers,	C	Damage , packing	
36.	Gasket & Packings	C	Damage , packing	
37.	Copper tubes	C	Damage , packing, corrosion	Provide end cap
38.	SS tubing	C	Damage , packing	Provide end cap
Rotating assemblies (pumps, blowers, stirrers, fans, compressors etc.)				
39.	Pumps	S	Damage , packing, corrosion	Shaft rotation
40.	Blowers/Compressors	S	Damage , packing, corrosion	Shaft rotation
41.	Agitators/stirrers/radial launders	C	Damage , packing, corrosion	Shaft rotation
42.	Rollers for chlorine tonner mounting	C	Damage , packing, corrosion	
43.	Centrifuge	S	Damage , packing,	
44.	Gear box	C	Damage , packing, corrosion	
45.	Bearings	C	Damage , packing, corrosion	
46.	Fans	S	Damage , packing, corrosion	
47.	Dosing skids	S	Damage , packing, corrosion	
48.	Pump assemblies	S	Damage , packing, corrosion	
49.	Air washers(INTERNALS)	S	Damage , packing	
50.	Air conditioners (split)	C	Damage , packing	

Sl. No.	Description of the equipment	Type of Storage	Check for	Remarks
51.	Elevators(CONTAINERIZED)	O	Damage , packing, corrosion	
52.	Chillers/VA machines	S	Damage , packing	
53.	Air handling Unit/Package unit	S	Damage , packing	
54.	Chlorinators & Evaporators	C	Damage , packing	
55.	Ejectors	C	Damage , packing	
56.	Electrolyser	C	Damage , packing	
Miscellaneous items like chain pulley blocks, hoists etc.				
57.	Chain pulley blocks	S	Damage, Packing	
58.	Electric hoists	S	Damage, Packing	
59.	Fire extinguishers	C	Damage, expiry date	
60.	Fork Lift Truck	S	Damage, Packing	
61.	Hydraulic Mobile Crane	O	Damage, Packing	
62.	Mobile Pick Up & Carry Crane	O	Damage, Packing	
63.	Motor boats	O	Damage, Packing	
64.	Safety showers	S	Damage, Packing	
65.	Diffusers/dampers	S	Damage, Packing	
Chemicals and consumables (acid, alkali, paints, oils, reagents and special chemicals)				
66.	Hydro Chloric Acid (HCl)	Store in canes/ storage tank in dyke area	Date of production/ leakage/fumes	hazardous chemical
67.	Sulphuric acid (H ₂ SO ₄)	Store in canes/ storage tank in dyke area	Date of production/ leakage/fumes	hazardous chemical

Sl. No.	Description of the equipment	Type of Storage	Check for	Remarks
68.	Sodium hydroxide (NaOH)	Store in canes/ storage tank in dyke area	Date of production/ leakage/ fumes/ breather	hazardous chemical ,breather to be checked for air ingress
69.	Sodium hypo chlorite	To be stored under shed	Date of production/ leakage/ fumes	hazardous chemical ,self-life normally 15-30 days after which strength of chemical decays
70.	Ammonia	S	Date of production/ leakage/ fumes	Store in closed storage tanks, hazardous chemical
71.	CW treatment chemicals	S	Date of production , Self-life	Store in closed canes
72.	RO/UF cleaning chemicals	S	Date of production , Self-life	Store in closed canes
73.	Lime	C	Damage to packing , seepage	Prevent moisture, rain
74.	Alum bricks	C	Damage to packing	Prevent moisture, rain
75.	Poly electrolyte	S		Store in closed storage tanks
76.	Laboratory chemicals(powder)	C	Damage, Packing self-life	
77.	Laboratory chemicals(liquid)	C	Damage, Packing self-life	
78.	Lubrication oils	C	Leakage	
79.	Paints	S	Leakage ,air tightness	
80.	Sand	O	Damage of packing	No hooks
81.	Salt (NaCl)	C	Damage of packing, water ingress	Prevent moisture, rain
82.	Anthracite	S	Damage of packing	
83.	Activated carbon	S	Damage of packing	

Sl. No.	Description of the equipment	Type of Storage	Check for	Remarks
84.	Thermal insulation	S	Damage of packing	
85.	Cement	C	Damage of packing	Prevent moisture, rain
86.	Gravels	O	Damage of packing	
87.	ION exchange resins	C	Damage , packing	Refer manufacturer guidelines
88.	RO membranes	C	Damage , packing	Refer manufacturer guidelines
89.	UF membranes	C	Damage , packing	Refer manufacturer guidelines
90.	Cleaning chemicals	C	Damage , packing	Refer manufacturer guidelines
91.	Chemicals for analysers/calibration	C	Damage , packing	Refer manufacturer guidelines
Electrical and C & I items (motors, cables etc.)				
92.	Motors	C	Damage , packing	
93.	Cable drums	O	Damage	
94.	Control Panel /control desk, UPS ,JB	S	Damage, Packing	
95.	Instruments(gauges/analysers)	C	Damage	
Special items		As per Manufacturer's item, like Hydrogen cylinders, Ozonator, Analyser, Chlorine dioxide generators etc.		

5. CONCLUSION

Concerned storage agency at site should make sure that loss in equipment performance and wear & tear are minimised through proper storage and preservation. The above are broad guidelines and cover major equipment / materials. However specific storage practices shall be followed as per manufacturer recommendation. All the necessary measures even in addition to the ones mentioned above, if found necessary, should be taken to achieve the objective.

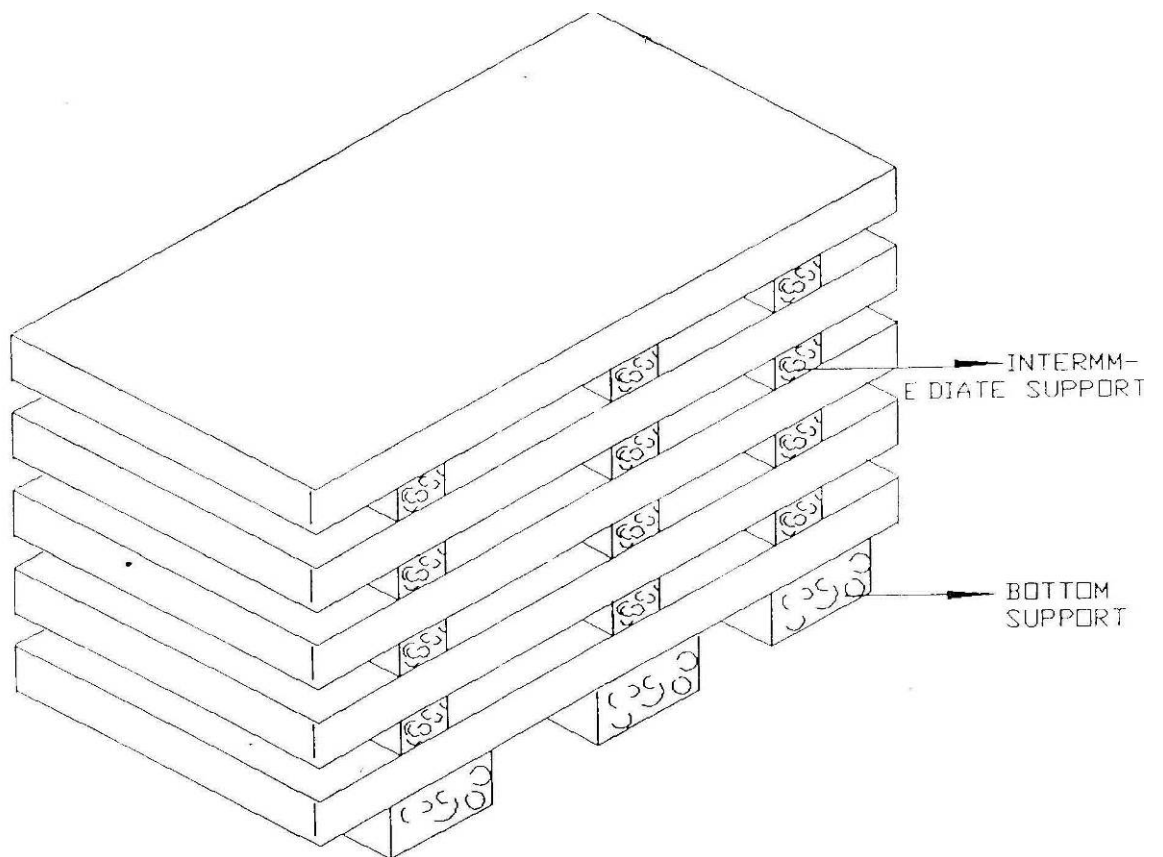


Figure – 1 – PLATE STACKING ARRANGEMENT

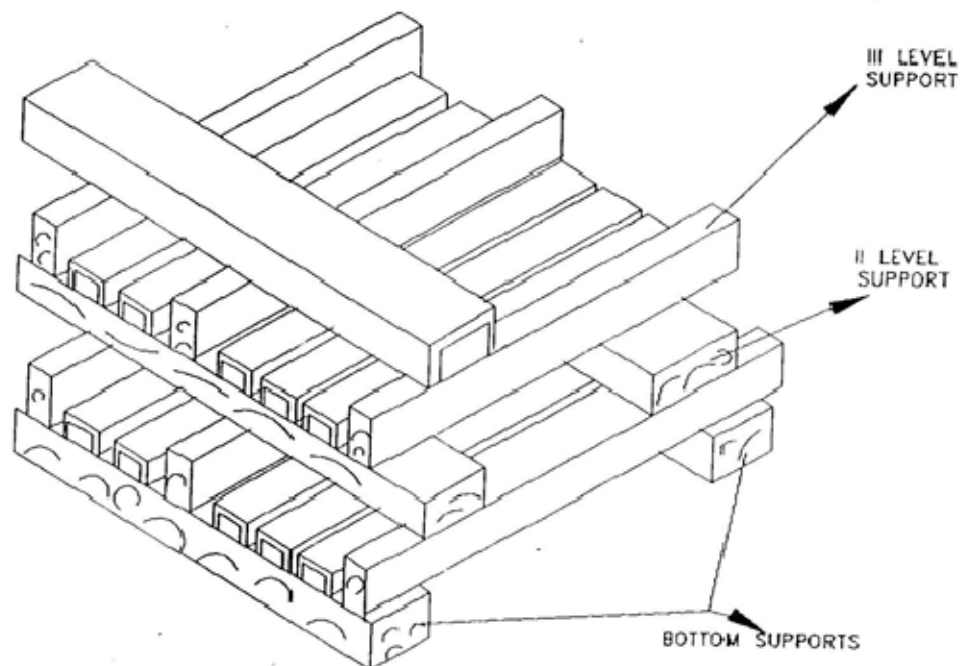


Figure – 2 – STRUCTURAL STEEL STACKING ARRANGEMENT



**4x111MW VISHNUGAD PIPALKOTI HEP
HVAC SYSTEM
PAINTING SPECIFICATION & COLOUR
SCHEME**

SPECIFICATION No: PE-TS-413-571-11000A-A001

SECTION : I

SUB-SECTION : E

REV 00

DATE: JAN 2020

SHEET 1 OF 1

SECTION-I

SUB SECTION E

ANNEXURE-VIII

**PAINTING SPECIFICATION & COLOUR SCHEME
(COVERED UNDER SECTION C2-B)**



**4x111MW VISHNUGAD PIPALKOTI HEP
HVAC SYSTEM
PACKING PROCEDURE**

SPECIFICATION No: PE-TS-413-571-11000A-A001

SECTION : I

SUB-SECTION : E

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DATE: JAN 2020

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SECTION-I

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ANNEXURE-VIII

**PACKING PROCEDURE
(COVERED UNDER SECTION C2-B)**



**4x111MW VISHNUGAD PIPALKOTI HEP
HVAC SYSTEM**

SPECIFICATION No: PE-TS-413-571-11000A-A001

SECTION: II

REV. 00

DATE: JAN 2020

SECTION II



**4x111MW VISHNUGAD PIPALKOTI HEP
HVAC SYSTEM
INSPECTION AND TESTING**

SPECIFICATION No: PE-TS-413-571-11000A-A001

SECTION : II

SUB-SECTION : 1

REV 00

DATE: JAN 2020

SHEET 1 OF 4

SECTION-II

SUB-SECTION-1

INSPECTION AND TESTING

	4x111MW VISHNUGAD PIPALKOTI HEP HVAC SYSTEM INSPECTION AND TESTING	SPECIFICATION No: PE-TS-413-571-11000A-A001	
		SECTION : II	
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1.01.00	Inspection and Tests during Manufacture.		
1.01.01	The method and techniques to be used by the Bidder for the control of quality during manufacture of all plant and equipment shall be agreed with the Owner.		
1.01.02	The Owner’s general requirements with respect to quality control and the required shop tests are set out elsewhere in this specification.		
1.01.03	Before any item of plant or equipment leaves its place of manufacture the Owner shall be given the option of witnessing inspections and tests for compliance with the specification and related standards.		
1.01.04	Advance notice shall be given to the Owner as agreed in the Contract, prior to the stage of manufacture being reached, and the piece of plant must be held at this stage until the Owner has inspected the piece, or has advised in writing that inspection is waived. If having consulted the Owner and given reasonable notice in writing of the date on which the piece of plant will be available for inspection, the Owner does not attend the Bidder may proceed with manufacture having forwarded to the Owner duly certified copies of his own inspection and test results.		
	The owner’s representative shall have at all reasonable times access to bidder’s or his sub-vendor’s premises and shall have power to inspect/ examine materials and workmanship or equipment under manufacture.		
	The Bidder shall forthwith forward to the engineer duly certified copies of the Test Certificates in six copies (one to the Purchaser and five to the Consulting Engineer) for approval. Further nine (9) copies of Shop Test Certificates shall be bound with Instruction Manuals referred to elsewhere.		
	For electrical equipment, routine tests as per relevant IS spec are to be carried out on all equipment. Type tests are also to be carried out on selected equipment as detailed in the specs of concerned electrical equipment.		
1.01.05	Under no circumstances any repair or welding of castings be carried out without the consent of the Engineer. Proof of the effectiveness of each repair by radiographic and/or other non-destructive testing technique, shall be provided to the Engineer.		
1.01.06	All the individual and assembled rotating parts shall be statically and dynamically balanced in the works. Where accurate alignment is necessary for component parts of machinery normally assembled on site, the Bidder shall allow for trial assembly prior to despatch from place of manufacture.		
1.01.07	All materials used for the manufacture of equipment covered under this specification shall be of tested quality. Relevant test certificates shall be made available to the		

	4x111MW VISHNUGAD PIPALKOTI HEP HVAC SYSTEM INSPECTION AND TESTING	SPECIFICATION No: PE-TS-413-571-11000A-A001	
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Purchaser. The certificates shall include tests for mechanical properties and chemical analysis of representative material. Equipment or parts coming under any statutory Regulations shall be certified by a Competent Authority under the regulations in the specified format.			
1.01.08	All pressure parts connected to pumping main shall be subjected to hydraulic testing at a pressure of 150% of shut-off head for a period not less than one hour. Other parts shall be tested for one and half times the maximum operating pressure, for a period not less than one hour.		
1.01.09	All necessary non-destructive examinations shall be performed to meet the applicable code requirements.		
1.01.10	All welding procedures adopted for performing welding work shall be qualified in accordance with the requirements of Section-IX of ASME code or IBR as applicable. All welded joints for pressure parts shall be tested by liquid penetrant examination according to the method outlined in ASME Boiler and Pressure Vessel code. Radiography, magnetic particle examination magnuflux and ultrasonic testing shall be employed wherever necessary/ recommended by the applicable code. At least 10% of all major but welding joints shall be radiographed unless otherwise stipulated.		
Statutory payments in respect of IBR approvals including inspection shall be made by the bidder. Bidder’s scope shall include to preparation of all necessary documents, co-ordination and follow-up for above approval. Owner shall only forward assistance/endorsement of documents /design /drawings /reports/records to be submitted for approval as stipulated/ required by Statutory Authorities till registration of the unit and clearance for commercial operation.			
1.02.00	Performance Tests at Site		
1.02.01	The full requirements for testing the system shall be agreed between the Owner and the Bidder prior to Award of Contract. The completely erected System shall be tested by the Bidder on site under normal operating conditions. The Bidder shall also ensure the correct performance of the System under abnormal conditions, i.e. the correct working of the various emergency and safety devices, interlocks, etc.		
1.02.02	The Bidder shall provide complete details of his normal procedures for testing, for the quality of erection and for the performance of the erected plant. These tests shall include site pressure test on all erected pipe work to demonstrate the quality of the piping and the adequacy of joints made at site.		
1.02.03	The Bidder shall furnish the quality procedures to be adopted for assuring quality from the receipt of material at site, during storage, erection, pre-commissioning to tests on completion and commissioning of the complete system/equipment.		
1.03.00	For details of specific tests required on individual equipment refer to respective section of this specification.		